Balanced Assessment *in* Mathematics

9

These tasks give you a chance to show how you reason and solve mathematical problems.

Please show your work and reasoning in the spaces provided.

Name: _____ Male Female

School: _____ City: _____

Teacher: _____ Grade: _____

Date: _____

Do not write in the box below:

9	Graphs	House Prices	Ash's Puzzle	How Old Are They?	Two Solutions	Total
	9	7	7	7	10	40
07						

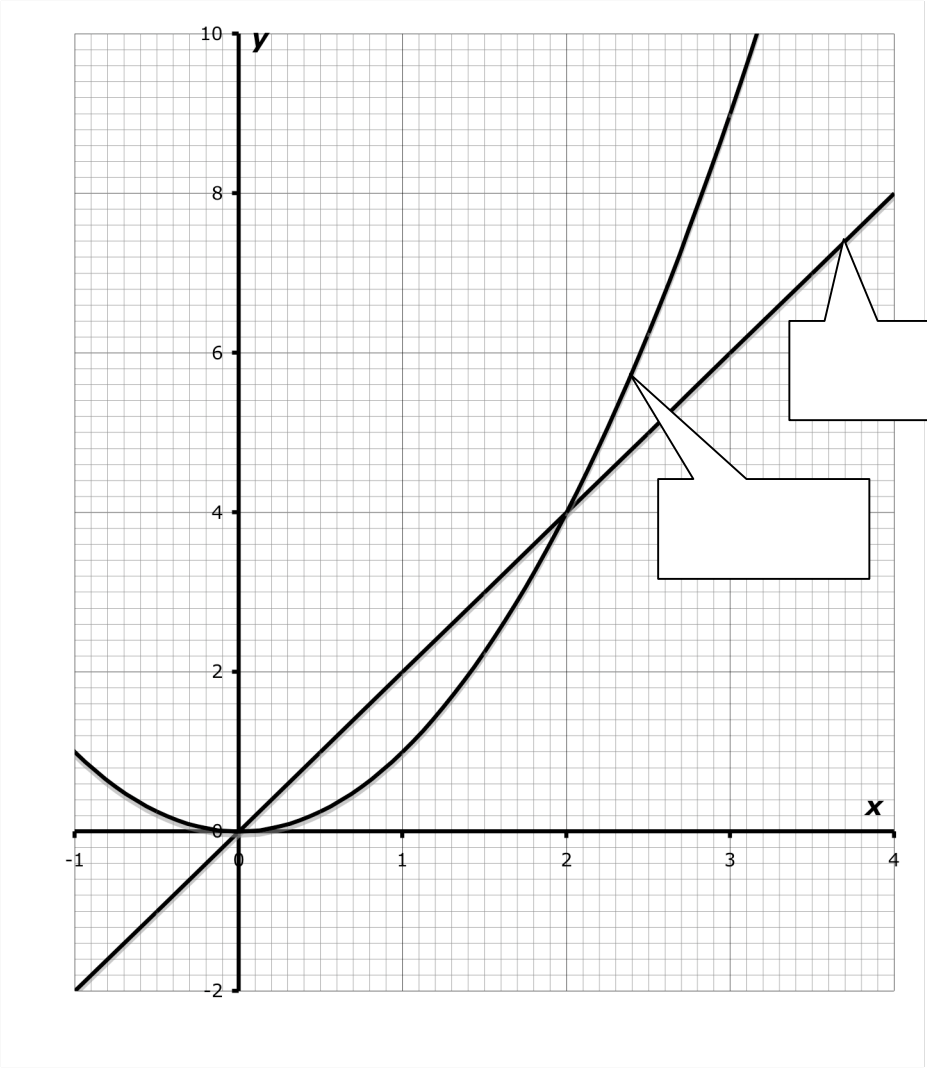
PLEASE TURN TO NEXT PAGE

Graphs

This problem gives you the chance to:

- work with linear and quadratic functions their graphs and equations

This diagram shows the graphs of $y = x^2$ and $y = 2x$.



1. Fill in the labels to show which graph is which. Explain how you decided.

2. Use the diagram to help you complete this statement:

$2x$ is greater than x^2 when x is between _____ and _____

3. The graphs of $y = x^2$ and $y = 2x$ cross each other at two points.

   a. Write down the coordinates of these two points. _____ _____

   b. Show how you can use algebra to find the coordinates of the two points where the two graphs cross.

4.

   a. On the diagram, draw the graph of $y = 3x$.

   b. What are the coordinates of the points where $y = x^2$ and $y = 3x$ meet?

   _____ _____

   c. Where do you think that the graphs of $y = x^2$ and $y = nx$ meet? _____ _____

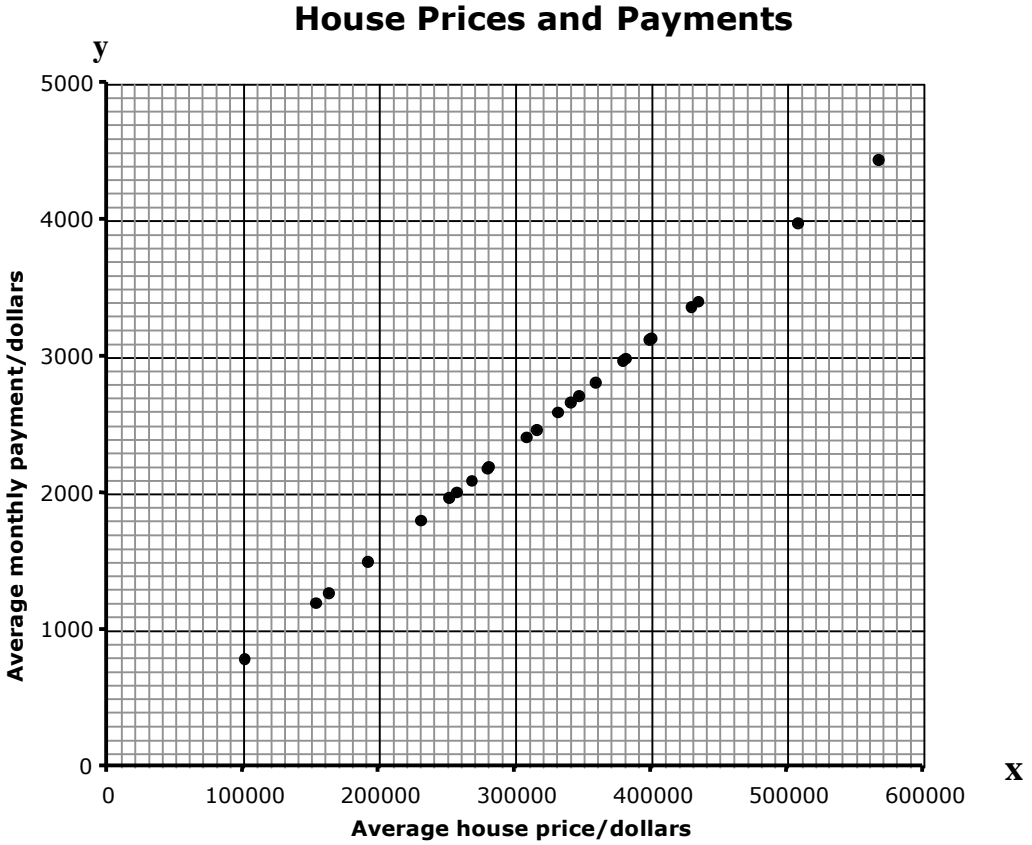
   d. Use algebra to prove your answer.

House Prices

This problem gives you the chance to:
• work with graphs and formulas in a real context

In March 2006, a newspaper article reported that houses in Maryland are so expensive that many people are unable to afford the monthly house payments.

This graph shows the average house price and the average monthly payment for all the different counties in Maryland.



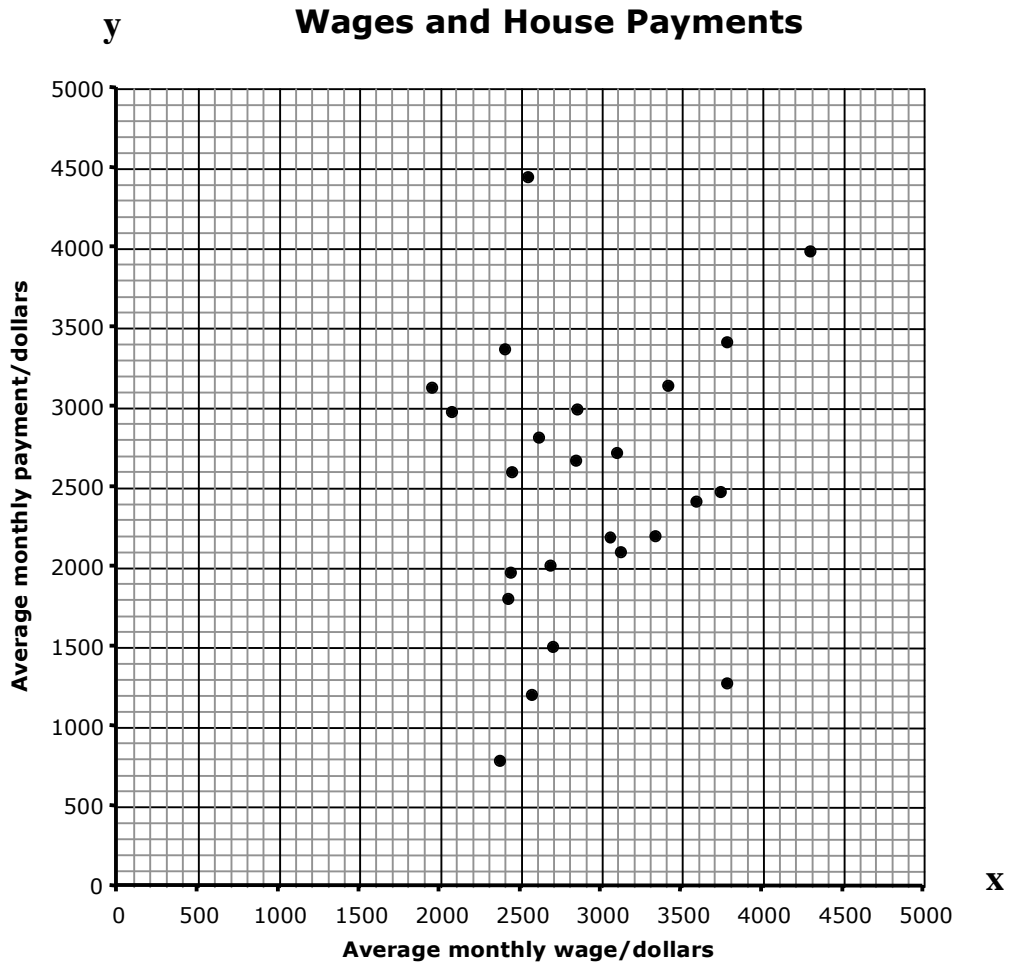
1.

a. What does the pattern of the data indicate about the connection between house prices and monthly payments?

b. Find the monthly payment for a house costing $450 000.

c. Find a formula connecting the average monthly payment with the average house price.

This graph shows the average monthly wage and the average monthly house payment for each county in Maryland.



2.

a. Describe the pattern of the data. _____

_____

b. Draw a ring round the point representing the county where the average person will find it most difficult to afford the monthly house payment. Label this point with the letter A.

c. Draw a ring round the point representing the county where the average person will find it easiest to afford the monthly house payment. Label this point with the letter B.

d. Indicate clearly which part of the graph contains points representing counties where the average monthly house payment is more than the average monthly wage.

_____

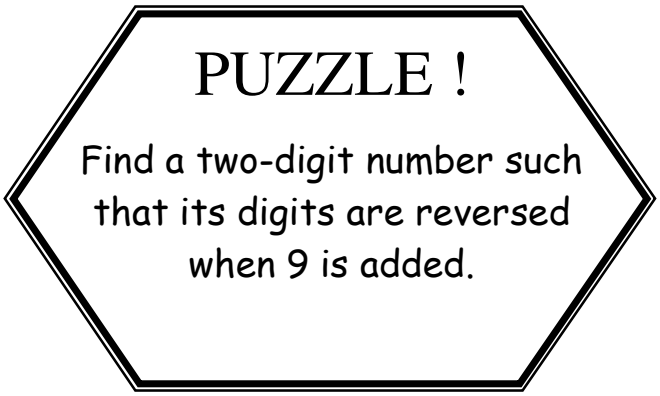
_____ 7

Ash's Puzzle

This problem gives you the chance to:

- find numbers that obey given rules
- find rules for sets of numbers

Ash has a book of number puzzles. This is one of the puzzles.



1. Solve this puzzle for Ash. _____

   Show that your answer works.

   Ash wonders if there are other answers to this puzzle.

2. Are there other correct answers to the puzzle? _____

   If there are more correct answers list them all. If not explain how you know that there is only one correct answer.

   _____

   _____

   _____

Ash decides to try to find a three-digit number such that its digits are reversed when 99 is added. He finds that there are a lot of numbers that work.

3. Write **four** three-digit numbers that Ash could have found.

_____ _____ _____ _____

Show your work.

Ash thinks that there must be rules that would make it possible to find all of the three-digit numbers that are reversed when 99 is added to them.

4. Find these rules for Ash.

_____

_____

_____

_____

_____

_____

_____

How Old Are They?

This problem gives you the chance to:

- form expressions
- form and solve an equation to solve an age problem

Will is *w* years old.

Ben is 3 years older.

1. Write an expression, in terms of *w*, for Ben's age.

_____

Jan is twice as old as Ben.

2. Write an expression, in terms of *w*, for Jan's age.

_____

If you add together the ages of Will, Ben and Jan the total comes to 41 years.

3. Form an equation and solve it to work out how old Will, Ben, and Jan are.

Will is _____ years old

Ben is _____ years old

Jan is _____ years old

Show your work.

4. In how many years will Jan be twice as old as Will? _____ years

Explain how you figured it out.

Two Solutions

This problem gives you the chance to:

- find solutions to equations and inequalities

1. For each of the following equalities and inequalities, find two values for x that make the statement true.

a. $x^2 = 121$ _____ _____

b. $x^2 = x$ _____ _____

c. $x^2 < x$ _____ _____

d. $(x-1)(5x^4 - 7x^3 + x) = 0$ _____ _____

e. $1776x + 1066 \geq 365$ _____ _____

f. $x^2 > x^3$ _____ _____

g. $|x| > x$ _____ _____

2. Some of the equations and inequalities on the page opposite have exactly two solutions; others have more than two solutions.

a. Write down two equations or inequalities that have exactly two solutions. Explain your answer.

b. Write down one equation or inequality that has more than two solutions, but not infinitely many solutions. Explain your answer.

c. Write down two equations or inequalities that have an infinite number of solutions.